APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/714,712	11/17/2003	Michael D. Gallant	03-1040 1496.00344	2328

24319   7590   03/28/2007

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EXAMINER
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ART UNIT	PAPER NUMBER
2621	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/28/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

PTOL-90A (Rev. 10/06)

	Application No.	Applicant(s)
Office Action Summary	10/714,712	GALLANT ET AL.
	Examiner	**Art Unit**	
	David N. Werner	2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☒ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____ .

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☒ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date *20031117, 20051027.*

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application

6)☐ Other: _____ .

DETAILED ACTION

Drawings

1.   The drawings are objected to under 37 CFR 1.83(a). The drawings must show

every feature of the invention specified in the claims. Therefore, the search for a third

motion vector for a first current block must be shown or the feature(s) canceled from the

claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in

reply to the Office action to avoid abandonment of the application. Any amended

replacement drawing sheet should include all of the figures appearing on the immediate

prior version of the sheet, even if only one figure is being amended. The figure or figure

number of an amended drawing should not be labeled as "amended." If a drawing figure

is to be canceled, the appropriate figure must be removed from the replacement sheet,

and where necessary, the remaining figures must be renumbered and appropriate

changes made to the brief description of the several views of the drawings for

consistency. Additional replacement sheets may be necessary to show the renumbering

of the remaining figures. Each drawing sheet submitted after the filing date of an

application must be labeled in the top margin as either "Replacement Sheet" or "New

Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner,

the applicant will be notified and informed of any required corrective action in the next

Office action. The objection to the drawings will not be held in abeyance.

2.   The drawings are objected to because in figure 3, the word "GLOBAL" is

misspelled as "GOLBAL" in block 142 and block 146. Corrected drawing sheets in

compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid

abandonment of the application. Any amended replacement drawing sheet should

include all of the figures appearing on the immediate prior version of the sheet, even if

only one figure is being amended. The figure or figure number of an amended drawing

should not be labeled as "amended." If a drawing figure is to be canceled, the

appropriate figure must be removed from the replacement sheet, and where necessary,

the remaining figures must be renumbered and appropriate changes made to the brief

description of the several views of the drawings for consistency. Additional replacement

sheets may be necessary to show the renumbering of the remaining figures. Each

drawing sheet submitted after the filing date of an application must be labeled in the top

margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If

the examiner does not accept the changes, the applicant will be notified and informed of

any required corrective action in the next Office action. The objection to the drawings

will not be held in abeyance.

Specification

3.   The disclosure is objected to because of the following informalities: in page 1,

line 9 and page 15, line 4, a co-pending related application is not properly identified, and

in page 10, line 4, the word "copied" is misspelled as "coped".

        Appropriate correction is required.

Claim Rejections - 35 USC § 101

4.   35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1-19 are rejected under 35 U.S.C. 101 because the claimed invention lacks patentable utility. Although the specification discloses circuitry for determining motion vectors (page 19, lines 12-14), the invention only claims *searching* for motion vectors without actually generating a motion vector or producing an output with a calculated motion vector. Therefore, claims 1-19 are directed toward mere mathematical manipulation of data, which lacks a useful, concrete, and tangible result. See *State Street*, 149 F.3d at 1373, 47 USPQ2d at 1601-1602. Compare with claim 20, which invokes 35 U.S.C. 112, sixth paragraph, and so encompasses mode decision tree circuit 202, as disclosed in the specification of the present invention, which determines motion vectors (page 19, lines 12-14).

Claim Rejections - 35 USC § 102

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5.   Claims 1 and 11-18 are rejected under 35 U.S.C. 102(e) as being anticipated by US Patent 6,473,460 B1 (Topper). Topper teaches a motion estimation system based

on first and second overlapping pixel blocks. Regarding claim 1, figure 2A shows three sets of overlapping blocks: first block set 212, second block set 214, horizontally offset from first block set 212 by four pixels, and third block set 216, vertically offset from first block set 212 by four pixels (column 3, line 65 – page 4, line 17). These block sets comprise blocks of eight by eight pixels, such as block 218 in first block set 212 and block 310 in second block set 214 (column 4, lines 51-54). Motion estimation processor 114 generates motion vector 222 for block 218, and applies it to sub-block 220, which is centrally located in block 218 and is of size four by four pixels (column 4, lines 25-31). The motion vector is searched over a displacement from 1 to 6 pixels from block 218 in the horizontal and vertical directions (column 4, lines 36-40). Motion estimation processor 114 then generates motion vector 314 for block 310, and applies it to sub-block 312, which is centrally located in block 310 and is of size four by four pixels. Motion estimation vector 114 takes reference values from prior field memory 112 (column 2, lines 64-67). Then, for first current block 220, processor 114 searches for first motion vector 222 from reference pixels in and adjacent to block 218, copies more reference samples from prior field memory 112, and searches for second motion vector 314 among block 310, copied from prior memory 112. Since block 218 and block 310 overlap over a strip of 4 by 8 pixels (figure 3B), second reference block 310 contains a portion of pixels that are also in first reference block 218.

Regarding claim 11, figure 6 shows the method performed by the apparatus of Topper. Regarding claim 12, motion processor 114 receives video information from prior field memory 112 before generating motion vectors for the current field (column 2,

line 67 – column 3, line 2). Regarding claim 13, figure 3B shows block 312 adjacent to

block 220, and regarding claim 14, reference block 310 contains pixels also in block

218, as well as pixels not in, but adjoining, block 218. Regarding claim 15, each time a

new field is received in current field memory 110, the previous field is transferred to

prior field memory 112 (column 2, lines 62-64).

Regarding claim 16, the process of calculating a motion vector to the right of a

given block is repeated for the entire width of an image (column 4, lines 65-66). Once

motion vectors are calculated for a row of blocks in the manner described above, a

motion vector is calculated for block 410, displaced four pixels below block 218. This

motion vector is applied to sub-block 412, which adjoins sub-block 220, as illustrated in

figure 4B. Block 410 is part of third block set 216. For each row of blocks, the motion

vector of a block beneath a current block is calculated (column 5, lines 14-28). Since

this is an iterative row-by-row process, old reference blocks may be dropped as needed.

Regarding claim 17, a four-by-four current block is central to a 20-by-20 first reference

block, that is, an eight-by-eight block with additional displacement of up to six pixels

horizontally or vertically in each direction (column 4, lines 36-40). Regarding claim 18,

the second reference block is displaced by a distance of four pixels to the right of the

first reference block, and the third reference block is displaced by a distance of four

pixels down from the first reference block.

Claim Rejections - 35 USC § 103

6.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

7.   Claims 2-9 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Topper, in view of US Patent 6,380,986 B1 (Minami et al.), cited in the Information

Disclosure Statement of 27 October 2005.

Claim 2 of the present invention differs from Topper, in that the present invention

encompasses a search memory as part of a motion vector search circuit, and Topper

does not disclose this feature. Minami et al. discloses a method for obtaining a motion

vector by matching a target block and a set of blocks each having the same size as the

template. Figure 16 of Minami et al. discloses a "conventional" motion vector search

apparatus (column 6, lines 66-67) with a search memory. Figure 16 shows search area

memory 23 as part of motion vector search apparatus 20. Regarding claim 2, an arrow

from search area memory 23 to processing device 21 indicates that the search memory

can be read from, and an arrow from image memory 24 to search area memory 23

indicates that the search memory can be written to. In Minami et al., template memory

22 contains a block that is to be matched, and search area memory 23 contains the

search area for the block (column 4, lines 51-55). Regarding claims 4-6, figure 1A of

Topper shows controller 118 that controls the memories and motion estimation

processor of Topper. Claim 20 of the present invention is in proper means-plus-function

format, and invokes 35 U.S.C. 112, sixth paragraph. Then, the "means for searching"

motion vectors and "means for copying" reference samples from an external memory

will be limited to a motion estimation processor circuit with a search memory and a

control system, as described in the specification and shown in figure 4 of the present

invention. Regarding claim 20, the motion estimation circuit and controller of Topper,

combined with the search area memory of Minami et al., and the external memory of

either prior invention, fully encompass the subject matter of claim 20.

Topper discloses the claimed invention except for a search memory in a motion

estimation circuit. Minami et al. teaches that it is known to provide a search area

memory in a motion vector search apparatus. Therefore, it would have been obvious to

one having ordinary skill in the art at the time the invention was made to add a search

memory to a motion estimation apparatus as taught by Minami et al., since Minami et al

states in column 4, lines 23-29 that such a modification would facilitate higher-speed

data transfer within the motion estimation apparatus than between the apparatus and an

external memory.

Claim 3 of the present invention differs from Topper in that in the present

invention, the search memory stores an array of at least 96 by 48 pixels, and in Topper,

the search window for a block is 20 by 20 pixels. Claim 7 of the present invention

differs from Topper in that in the present invention, a column of reference blocks are

copied from the external memory, and in Topper, only one block is searched at a time.

Claim 8 of the present invention further limits the column to a 1-by-3 column. However,

figure 17 of Minami et al. shows a slice technique in which an image is divided into

vertical slices, and subdivided into horizontal strips of the same width of a template

block (column 4, lines 42-45). This technique is performed using the previously

discussed apparatus of figure 16. Regarding claim 3, figure 17 shows search areas 29

and 30 to be of arbitrary size: larger than blocks 27 and 28, but smaller than image 25.

Regarding claims 7 and 8, figure 17 shows newly searched area 31 as a column of

blocks. Regarding claim 9, newly searched area 31 is adjacent to search area 30,

already stored in a search memory (column 4, lines 57-61).

Topper discloses the invention of claim 7 and claim 9 except for refreshing the

search range of a motion vector for a block in a column adjoining the previously

searched area. Minami et al. teaches that it is known to divide an image into blocks and

successively search among a plurality of blocks. Therefore, it would have been obvious

to one having ordinary skill in the art at the time the invention was made to successively

search for a motion vector from left to right columns as taught by Minami et al., since

Minami et al. states in column 4, lines 61-67 that such a modification would save

redundant transfer of pixels into a search memory. Furthermore, the combination of

Topper and Minami et al. discloses the invention of claim 3 and claim 8 except for the

specification of a search window to be at least 96 by 48 pixels and the specification of a

column copied from a memory to be a 1 by 3 array of blocks. However, it would have

been an obvious matter of design choice to specify the dimensions of search areas,

since such a modification would have involved a mere change in the size of a

component, which is generally recognized as being within the level of ordinary skill in

the art. See In re Rose, 105 USPQ 237 (CCPA 1955).

8.   Claims 10 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Topper in view of US Patent Application Publication 2002/0176500 A1

(Bakhmutsky et al). Topper discloses a system for finding motion vectors in which

motion vectors are searched using three reference sets. The present invention differs

from Topper in that in the present invention, two reference sets are used to search for

motion vectors for the same block, and in Topper, each reference set is used to search

for a motion vector in a different block. Bakhmutsky et al. teaches a system for field

prediction motion estimation. In Bakhmutsky et al., a 16 by 16 macroblock is divided

into two portions, and each portion is searched in the top field of a reference picture and

the bottom field of a reference picture [0016]. Thus, four searches are done in parallel.

The resultant motion vector for the macroblock is the one that generates the least error.

Regarding claim 10, figure 3 shows an apparatus with four parallel search engines that

each generate an error metric for the top field or bottom field of a macroblock in the top

or bottom field of an anchor picture [0038]. A series of logic elements produces the best

match for each search engine, and the chosen motion vector for the macroblock is the

best match according to the top field, the bottom field, and the whole frame. Regarding

claim 19, figure 2 shows a block diagram for the method of motion estimation using field

prediction.

Topper discloses the claimed invention except for searching for a motion vector

for a block in two reference sets. Bakhmutsky et al. teaches that it was known to search

for a motion vector for a block in the top field and the bottom field of the image.

Therefore, it would have been obvious to one having ordinary skill in the art at the time

the invention was made to perform multiple parallel searches for different fields as

taught by Bakhmutsky et al., since Bakhmutsky et al. states in paragraph [0016] that

such a modification would allow a plurality of motion estimation modes to be performed

concurrently.

Conclusion

9.   The prior art made of record and not relied upon is considered pertinent to

applicant's disclosure:

- US Patent 6,359,921 B1 (Boon)

- US Patent 6,272,179 B1 (Kadono)

- US Patent 6,215,822 B1 (Bose et al.)

- US Patent 6,108,040 A (Moteki et al.)

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to David N. Werner whose telephone number is (571) 272-

9662. The examiner can normally be reached on Monday-Friday from 8:30 AM - 5:00

PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Mehrdad Dastouri can be reached on (571) 272-7418. The fax phone

number for the organization where this application or proceeding is assigned is 571-

273-8300.

Information regarding the status of an application may be obtained from the

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DNW

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